Fig. 1

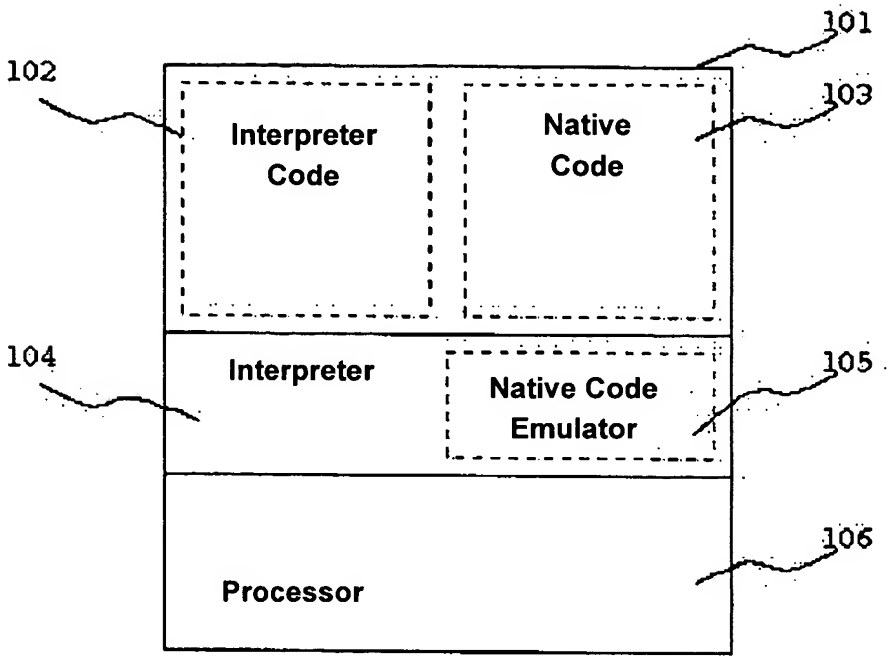

101
102
103
Interpreter Code
Native Code
104
Interpreter
105
Native Code Emulator
106
Processor

Fig. 2

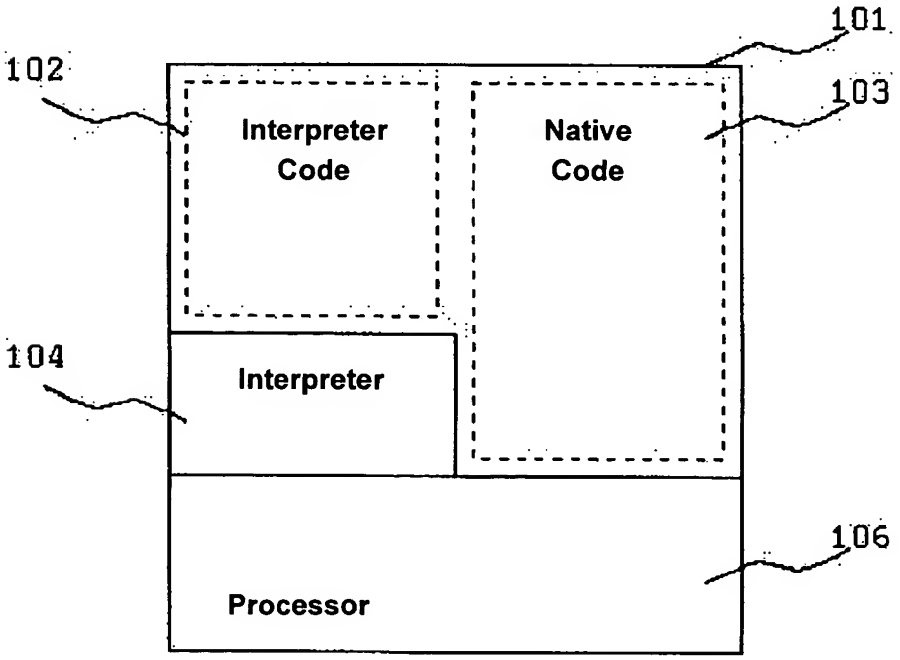

101
102
103
Interpreter Code
Native Code
104
Interpreter
106
Processor

Fig. 3

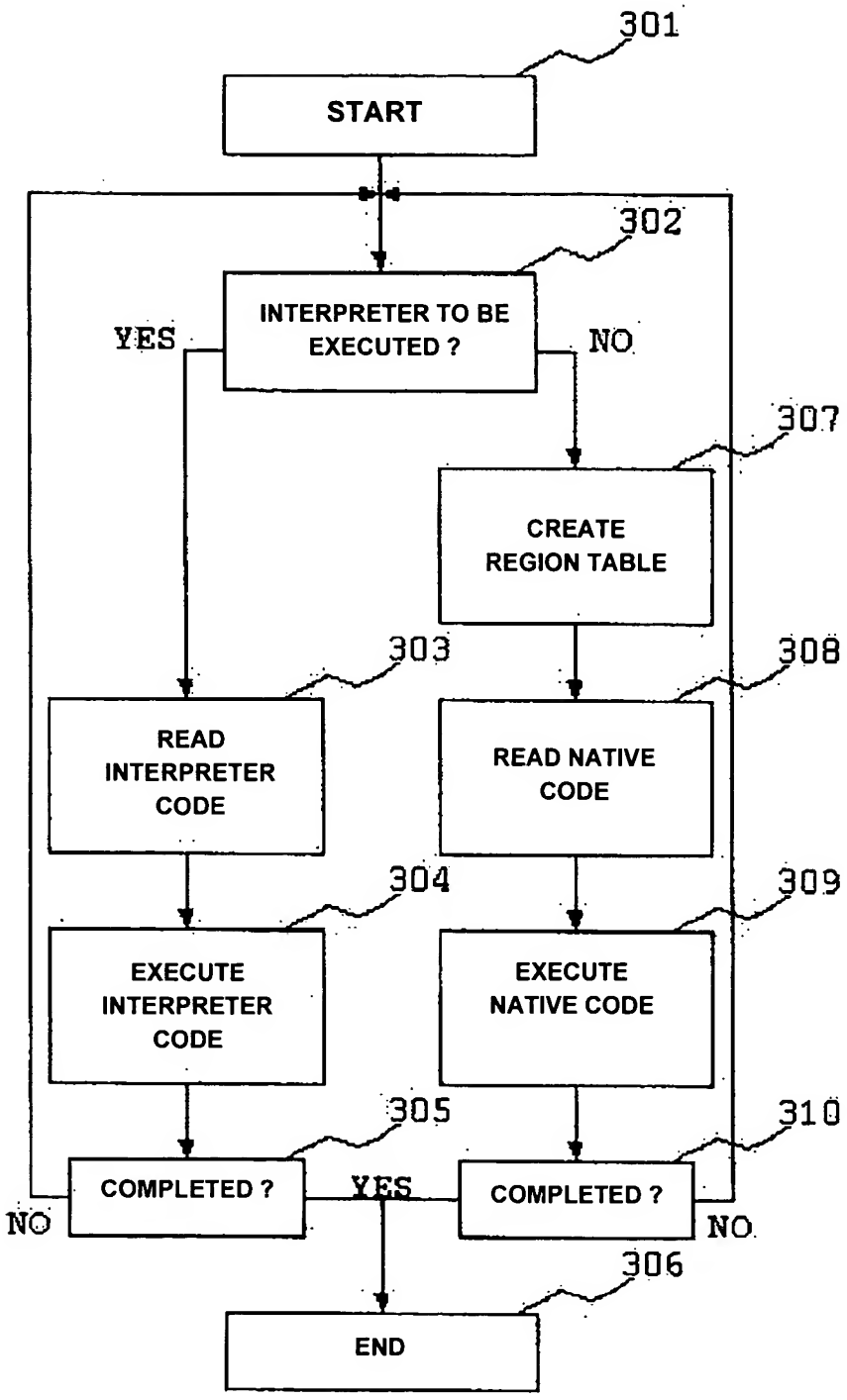

301
START
302
INTERPRETER TO BE EXECUTED ?
YES
NO
307
CREATE REGION TABLE
303
READ INTERPRETER CODE
308
READ NATIVE CODE
304
EXECUTE INTERPRETER CODE
309
EXECUTE NATIVE CODE
305
COMPLETED ?
YES
NO
310
COMPLETED ?
NO
306
END

Fig. 4

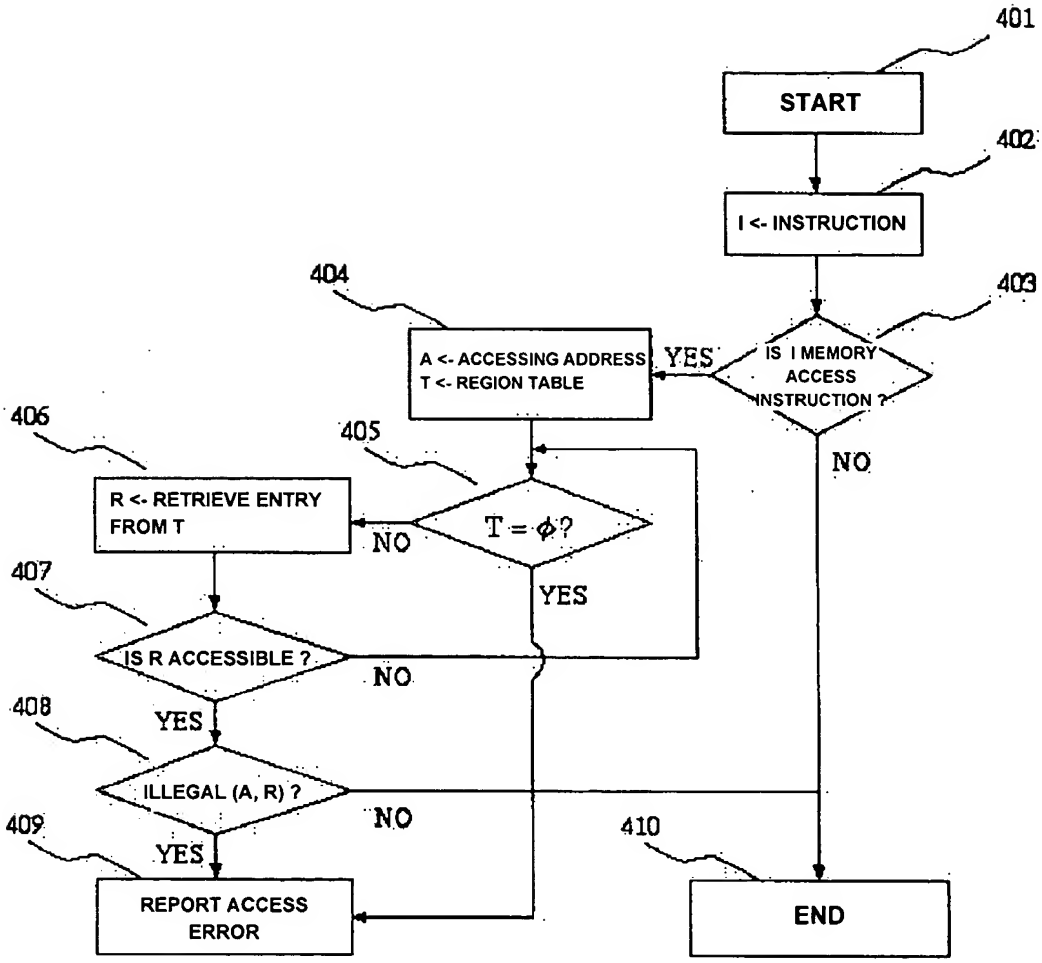

401
START
402
I <- INSTRUCTION
403
IS I MEMORY ACCESS INSTRUCTION ?
YES
404
A <- ACCESSING ADDRESS
T <- REGION TABLE
NO
405
T = φ ?
NO
YES
406
R <- RETRIEVE ENTRY FROM T
407
IS R ACCESSIBLE ?
NO
YES
408
ILLEGAL (A, R) ?
NO
YES
409
REPORT ACCESS ERROR
410
END

Fig. 5

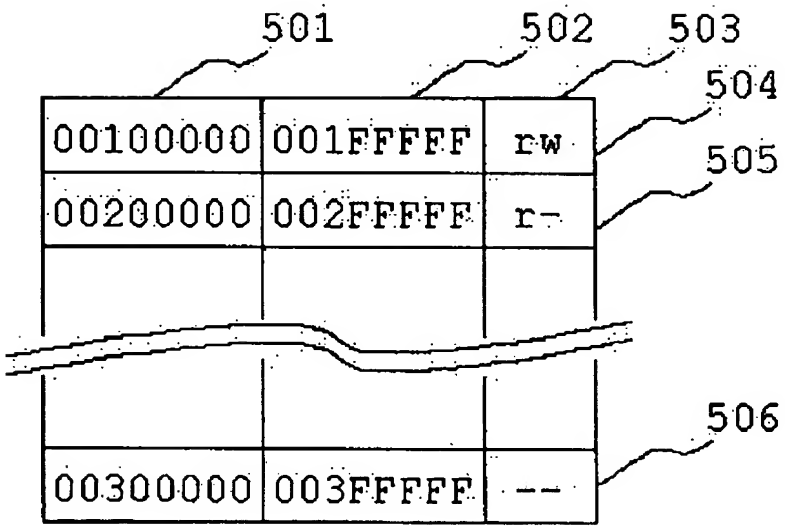


Fig. 6 (a)

```
class C {
  static native void foo(Object obj);
  static void bar(Object obj) {
    foo(obj);
  }
}
```

(a) Java Code

Fig. 6 (b)

```
JNIEXPORT void JNICALL Java_C_foo(
  JNIEnv *env, jclass cls, jobject obj) {
  int *p = (int *)obj;
  *p = 0;                              // (1)
}
```

(b) Nativ Cod

Fig. 7

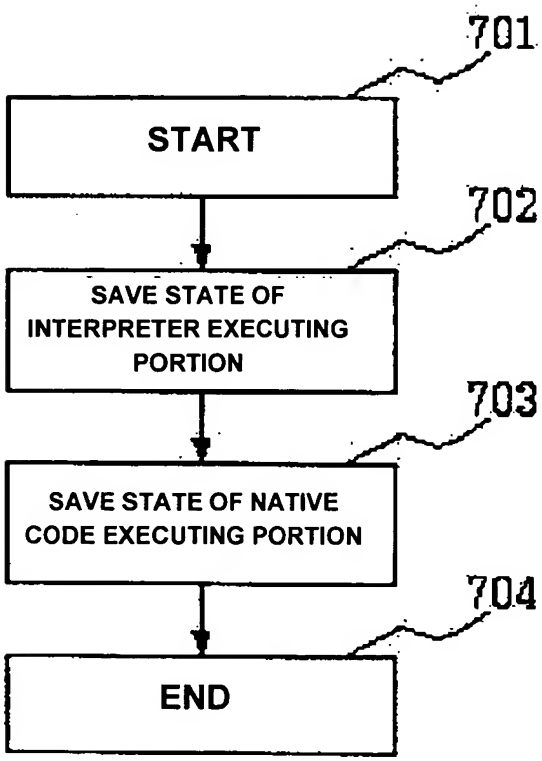

701
START
702
SAVE STATE OF INTERPRETER EXECUTING PORTION
703
SAVE STATE OF NATIVE CODE EXECUTING PORTION
704
END

Fig. 8

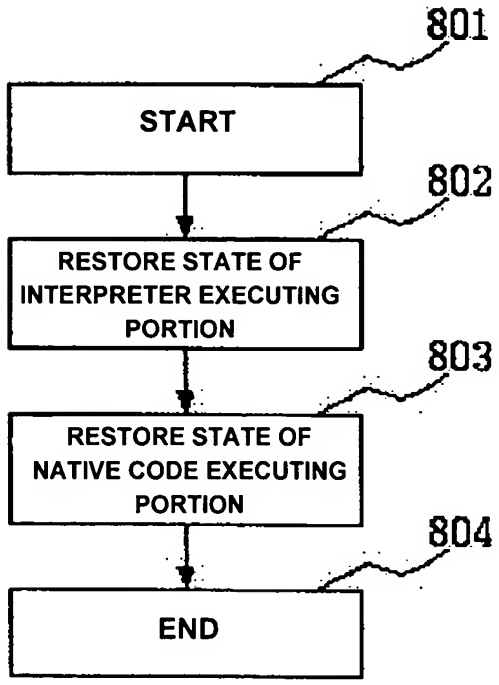

801
START
802
RESTORE STATE OF INTERPRETER EXECUTING PORTION
803
RESTORE STATE OF NATIVE CODE EXECUTING PORTION
804
END

Fig. 9 (a)

```
class C {
  static native void foo();
  static void bar() {
    for(int j=0; j < 10; j++) {
      foo();
    }
  }
}
```

(a) Java Code

Fig. 9 (b)

```
JNIEXPORT jint JNICALL Java_C_foo(
  JNIEnv *env, jclass cls) {
  jint s = 0;
  for(int i = 0; i < 100; i++) {
    s = s + 1;
  }
  return(s);
}
```

(b) Native Code

Fig. 10

Interpreter

Variable	Value
j	3
PC	...

Native Code

Variable	Value
i	10
s	45
PC	...

Fig. 11

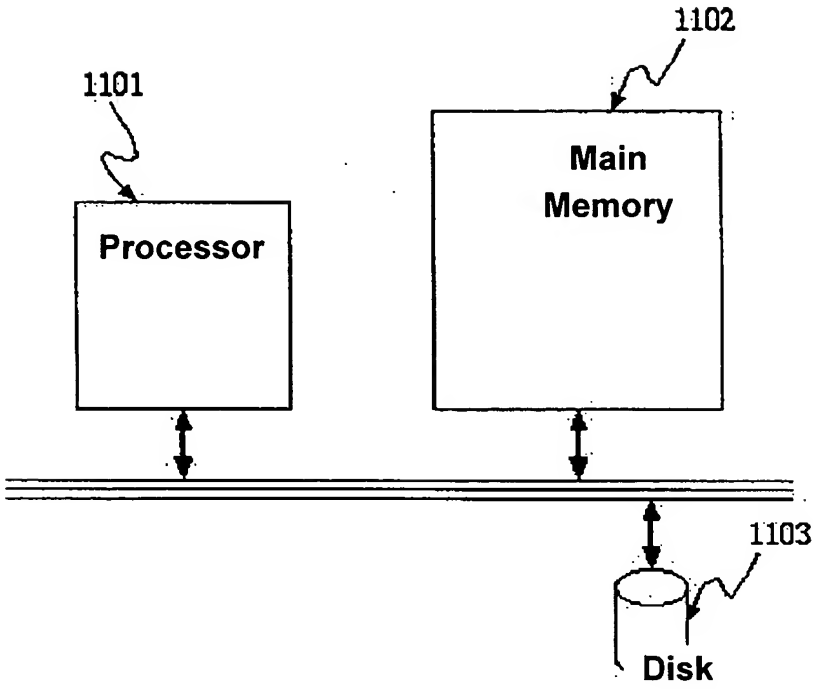


Fig. 12

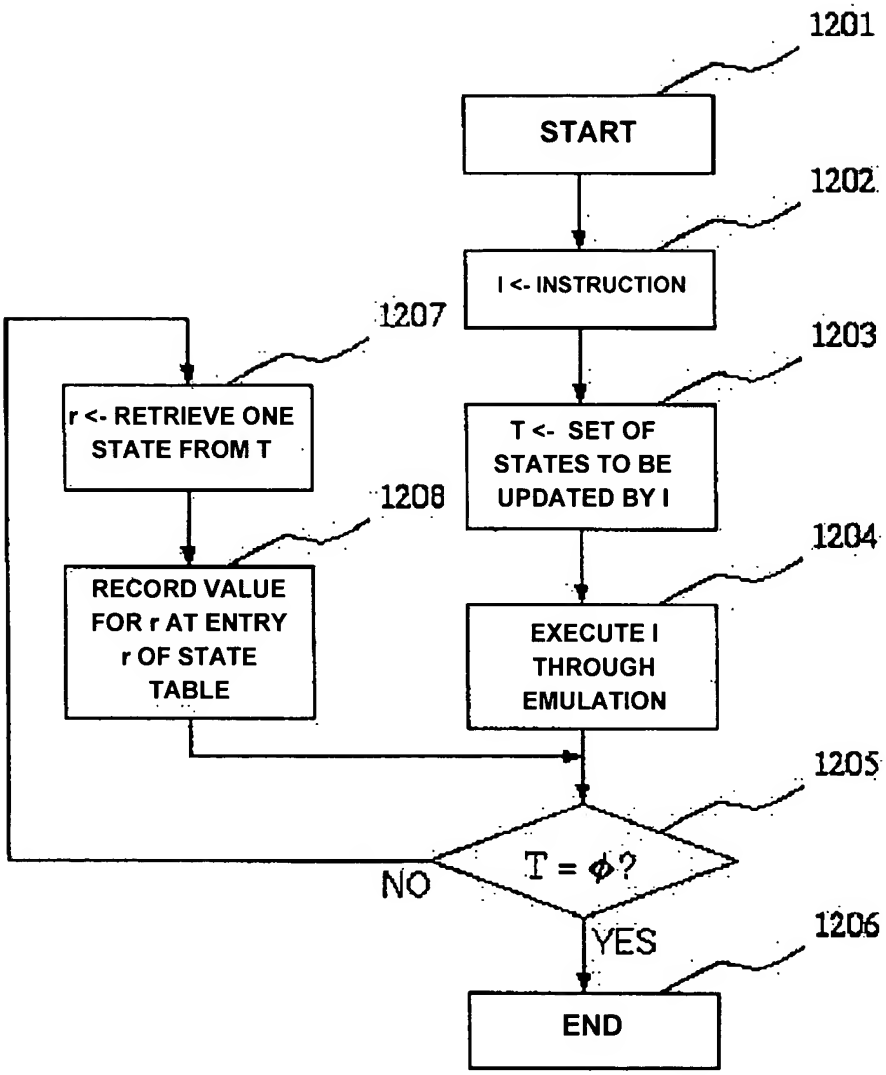
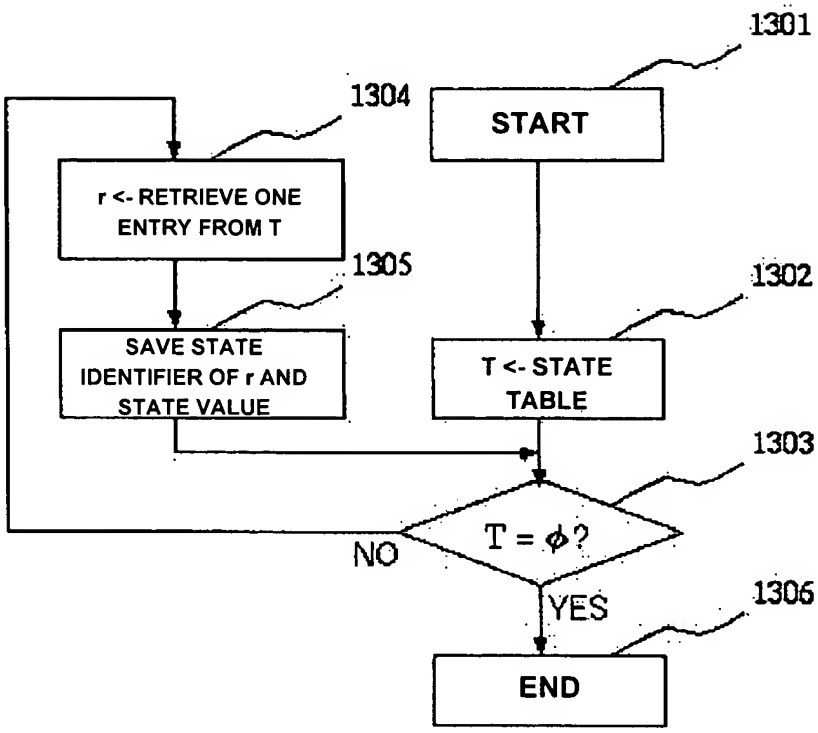

1201
START
1202
I <- INSTRUCTION
1203
T <- SET OF STATES TO BE UPDATED BY I
1204
EXECUTE I THROUGH EMULATION
1205
T = φ?
NO
YES
1206
END
1207
r <- RETRIEVE ONE STATE FROM T
1208
RECORD VALUE FOR r AT ENTRY r OF STATE TABLE

Fig. 13


1301
START
1304
r <- RETRIEVE ONE ENTRY FROM T
1305
SAVE STATE IDENTIFIER OF r AND STATE VALUE
1302
T <- STATE TABLE
1303
T = ϕ?
NO
YES
1306
END